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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,128	01/17/2006	Tatsuo Shimizu	06.22.01.P	7793

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EXAMINER	
BARROW, AMANDA J	

ART UNIT	PAPER NUMBER
1729	

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09/20/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/565,128	SHIMIZU ET AL.	
	Examiner	Art Unit	
	AMANDA BARROW	1729	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 August 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-21* is/are pending in the application.

5a) Of the above claim(s) *2,3,7-11 and 16-21* is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1,4-6 and 12-15* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/1/2011 and 6/1/2011 (2 IDS's filed on same date)*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1, 4-6 and 11-15 therein, without traverse in the reply filed on 8/16/2011 is acknowledged. Applicant's election without traverse of Species 2, claims 12-13 therein, without traverse is also acknowledged.

Claims 1, 4-6 and 12-15 of the Application will be examined. Claims 2, 3, 7-11 and 16-21 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected election or species, there being no allowable generic or linking claim.

2. The texts of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on 9/4/2009.

Claim Rejections - 35 USC § 112

3. The claim rejection on 35 U.S.C. 112, second paragraph, on claim 8 is withdrawn as the claim is no longer being examined (it is within non-elected Group II).

4. Claim 15 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for:

> "A conducting material such as aluminum and copper that allows electricity to flow therethrough, can be used for the current collecting substrates, and a support material, such as ceramic or glass, attached to the conducting material, such as metal or carbon as well as stainless steel, can be used for the current collecting substrates," (paragraph 24 of Applicant's specification),

does not reasonably provide enablement for, "wherein the current collecting structure is selected from the group consisting of ceramic and glass" as recited in claim 15. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. Specifically, the current collecting structure is comprised of two entities as claimed in claim 1, a current collecting substrate and a carbon material formed on the substrate; thus, by claiming that the current collecting structure is selected from the group consisting of ceramic and glass, the claims include new matter that is not supported in the specification. Appropriate correction is required.

5. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, claim 15 recites the current collecting structure is selected from the group consisting of ceramic and glass; however, as the current collecting structure is comprised of two entities as claimed in claim 1, a current collecting substrate and a carbon material formed on the substrate, it is unclear which of these is suppose to comprise the ceramic or glass portion. Appropriate correction is required.

6. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: that the ceramic or glass portion is a support material for

the current collecting substrate as supported in the specification (paragraph 24). Appropriate correction is required.

7. The following is a quotation of the fourth paragraph of 35 U.S.C. 112:

> Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

8. Claims 12 is rejected under 35 U.S.C. 112, fourth paragraph, as being in improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Specifically, claim 12 recites that the carbon material is selected from the group consisting of hard carbon, soft carbon, and a mixture of hard carbon and soft carbon. The carbon used inherently has to be one of these three options as there are no other options (the carbon is either soft, hard or a mixture); thus, the subject matter of claim 1 is not further limited. Appropriate explanation or correction is required.

Claim Rejections - 35 USC § 103

9. The rejection under 35 U.S.C. 103(a) as being unpatentable over Tajima et al JP 40-1091167A in view of Tanjo (US Patent Application 2002/0028380) on claims 8 and 10 is withdrawn as the claims are no longer being examined (they are within non-elected Group II).

10. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Tajima et al. (JP 40-1091167A) in view of Tanjo (US 2002/0028380) on claims 1, 4 and 6 are withdrawn as Applicant's arguments are persuasive.

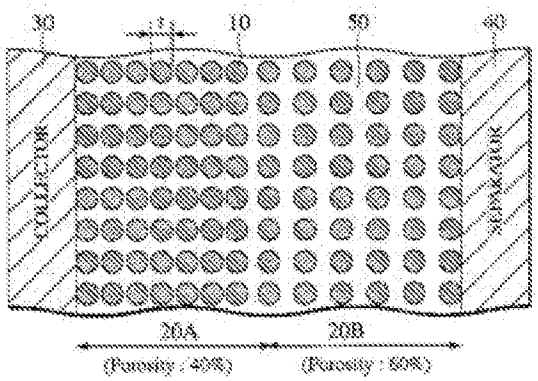
11. Claims 1, 4, 6, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tajima et al. (US 4,931,240) in view of Tanjo (US 2002/0028380) and Clark et al. (US 3,647,511).

Regarding claim 1, Tajima discloses a carbon electrode ("current collecting structure") that includes an electroconductive substrate ("current collecting substrate") that has a carbon material directly deposited on the conductive substrate ("current collecting substrate") without the use of binders (column 1, line 15- column 2, line 17). Tajima teaches that this method of production of a carbon electrode overcomes the disadvantage that the inclusion of a binding agent results in a decrease in the amount of active material inducing a decrease in energy density (column 1, lines 27-50).

Tajima does not disclose the density (void percentage) of the carbon material on the current collecting substrate; however, Tanjo discloses analogous art of a battery having a collector 30 ("current collector substrate") with an active material layer 20 containing the positive electrode active material (paragraph 44). Tanjo teaches that the active material layer 20 may have a plurality of active material layers having different porosities (paragraph 51). The electrode may have a two layer structure in which the layer closer to the separator 20B ("the upper region") has a porosity larger than the active material layer 20A closer to the collector. In other words, the active material has a higher density/lower void percentage in the area near the

current collector 30 than in the area closer to the separator ("upper region"). This is illustrated below in Figure 3:

FIG.3



Tanjo teaches that the amount of the electrolytic solution 50 in the vicinity of the separator 40 can be increased and the migration power of lithium ion can be increased by making the porosity of the active material layer 20B adjacent to the separator 40 large. Moreover, a usage rate of the active material 10 in the vicinity of the collector 30 can be increased by making the porosity in the vicinity of the collector 30 small. Thus, the power density can be effectively increased by balancing the diffusion in the positive electrode active material 10 and the migration in the electrolytic solution 50. Since the energy density is influenced by an average porosity and the active material amount of the active material layer 20, the power density can be increased without sacrificing the energy density by appropriately adjusting the average porosity and the amount of the active material (paragraph 51).

Furthermore, Clark discloses a method of forming carbon/ graphite composite articles in which a substrate of a carbon/graphite fibrous material is infiltrated with a pyrolytic material in order to controllably achieve the desired final part density (column 2, line 64 - column 3, line 20). No binders are used in the process as the carbon is deposited via a vapor deposition

technique from a carbonaceous gas such as methane (column 11, line 50- column 12, line 35). Clark teaches that the rate of deposition of the pyrolytic carbon is a function of the pressure, temperature and rate of flow of the gases, the gas composition and the gas residence time and that the final densities of the composite may be controlled using these parameters (column 12, lines 25-27; column 1, lines 21-35).

Therefore, it would have been obvious to a person of ordinary skill in the art to modify the carbon layer of Tajima to have a higher density/lower void percentage near the collector as compared to the "upper region" near the separator because Tanjo teaches such a configuration (Figure 3) and that this allows for an increase in migration power of the lithium ion and an increased usage rate of the active material in the vicinity of the collector which effectively increases the power density (paragraph 51) while Clark teaches that it is known in the art to deposit a carbonaceous material on a conductive substrate and that the rate of deposition and final density of the material is a function of the function of the pressure, temperature and rate of flow of the gases, the gas composition and the gas residence time (column 12, lines 25-27; column 1, lines 21-35).

Regarding claim 4, Tajima discloses that a charge carrier capable of reversible intercalation and deintercalation ("electrode active material") is supported on the carbon material deposited on the substrate (see abstract).

Regarding claim 6, Tajima discloses that the electrode is to be used in a battery (see abstract).

Regarding claim 12, Tajima discloses that carbon material as an active material is directly deposited on the substrate (column 1, line 62- column 2, line 17). Inherently, the carbon material

has to be one of soft carbon, hard carbon, or a mixture thereof, as there are no other options. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. Inherency is not established by probabilities or possibilities. *In re Robertson*, 49 USPQ2d 1949 (1999).

Regarding claim 13, Tajima discloses that the carbon electrode can be used as a positive electrode and/or a negative electrode depending upon the kind of charge carrier material (column 3, lines 33-35). Thus, the current collecting structure within the electrode is either a positive and/or negative current collecting structure for the positive and/or negative electrodes, respectively.

12. Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tajima et al. (US 4,931,240) in view of Tanjo (US 2002/0028380) and Clark et al. (US 3,647,511) as applied to claims 1, 4, 6, 12 and 13 above, and further in view of Nakai et al. (US 2002/0122983).

Regarding claims 5 and 14, Tajima does not disclose the mean particle diameter of the material capable of being reversibly intercalated and deintercalated ("electrode active material"); however, Nakai teaches that in using electrode active materials that have a small average particle diameter (0.1 to 2 microns), the reaction area of the active material is optimized therefore improving the power characteristic without enlarging the size of the battery (paragraph 13).

Therefore, it would have been obvious to a person of ordinary skill in the art to optimize the particle diameter of the electrode active material of Tajima because Nakai teaches that in using particles with small diameters (0.1 to 2 microns), the reactive area of the active material is

optimized therefore improving the power characteristic without enlarging the size of the battery (paragraph 13). The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980) (see MPEP § 2144.05, II.).

Furthermore, in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. *In re Wertheim*, 541 F.2d.257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990); *In re Geisler*, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed Circ. 1997). See MPEP 2144.05. Thus, a prima facie case of obviousness exists as the claimed ranges of less than 2 microns and less than 1 micron as recited in claims 5 and 14, respectively, overlap or lie inside the range disclosed by Nakai.

13. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tajima et al. (US 4,931,240) in view of Tanjo (US 2002/0028380) and Clark et al. (US 3,647,511) as applied to claims 1, 4, 6, 12 and 13 above, and further in view of Lyman (US 5,793,603).

Regarding claim 15, Tajima fails to disclose that the electrode substrate functioning as the current collecting structure comprises ceramic or glass as claimed; however, Lyman discloses analogous art electrode making in which an anode ("negative electrode") is made of three layers including a supporting substrate layer 32, a current collector layer 34 and an electrode layer 36 (column 5, line 66- column 6, line 15). The substrate layer 32 along with the current collector layer may be composed of ceramic fibers coated with metal.

Therefore, it would have been obvious to one of ordinary skill in the art to modify the electrode substrate functioning as the current collecting structure of Tajima to include a supporting substrate layer composed of ceramic fibers coated with metal because Lyman discloses such a configuration and that the ceramic fibers coated with metal provide a supporting layer for the electrode (column 5, line 66- column 6, line 15).

Response to Arguments

14. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Froberg (US 3,944,686) discloses analogous art of a porous fibrous carbon infiltrated with pryolytic graphite useful as electrodes in fuel cells; no binder is used.

(JP 09-315808) discloses an electrode formed of a graphite substrate which undergoes a plasma treatment to deposit a graphite thin film thereon (claims); no binder is used.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMANDA BARROW whose telephone number is (571)270-7867. The examiner can normally be reached on 7:30am-5pm EST. Monday-Friday, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ula Ruddock can be reached on 571-272-1481. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Examiner, Art Unit 1729

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